Cooke Hydroelectric Plant, South Embankment
Cooke Dam Road at the Au Sable River
Oscoda Vicinity
Iosco County
Michigan

HAER No. MI-98-E

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

Historic American Engineering Record
National Park Service
Mid-Atlantic Regional Office
Department of the Interior
143 South Third Street
Philadelphia, PA 19106

HISTORIC AMERICAN ENGINEERING RECORD

COOKE HYDROELECTRIC PLANT, South Embankment

HAER No. MI-98-E

Location: Cooke Dam Road at the Au Sable River
Oscoda Vicinity
Iosco County, Michigan

UTM: 17:295440:4927320
Quad: Sid Town, Mich., 1:24,000

Date of Construction: 1911

Engineer: William G. Fargo, Fargo Engineering Company, Jackson, Michigan

Present Owner: Consumers Power Company
212 West Michigan Avenue, Jackson, Michigan 49201

Present Use: Dam for hydroelectric generating plant

Significance: The South Embankment is part of a semi-hydraulic fill dam at the Cooke Hydroelectric Plant that impounds water for use in generating electric power. The dam was designed by William G. Fargo of Jackson, Michigan, a civil engineer who helped pioneer the hydraulic-fill construction method in the Midwest. When the plant went on line in 1912, it set a new record for transmission voltage.

Project Information: This documentation was prepared by Consumers Power Company (CPCo) in conformance with its Cultural Resources Management Plan for the Au Sable River Hydroelectric Projects (July 1995). The plan stipulated the recordation of the entire Cooke Hydroelectric Plant (according to the standards of the Historic American Engineering Record) as mitigation for the planned rehabilitation of the plant's concrete spillway. The documentation was completed in 1996 by Hess, Roise and Company of Minneapolis under contract with CPCo. Jeffrey A. Hess served as Principal Investigator and Cynthia de Miranda as Project Historian. Project photography was completed under a subcontract with Hess Roise by Clayton B. Fraser of Loveland, Colorado.

PHYSICAL DESCRIPTION

The dam at the Cooke Hydroelectric Plant on the Au Sable River consists of two earthen embankments with an intervening Powerhouse (HAER No. MI-98-C) and Spillway (HAER No. MI-98-B). Together, these structures form a "V"-shaped facility which points upstream (west). The South Embankment, 90'-0" long and about 54' high, combines with the Powerhouse and Spillway to compose the southern arm of the facility. The longer North Embankment (HAER No. MI-98-A) occupies the remainder of the channel between the Spillway and the river's north bank.

The South Embankment displays a roughly trapezoidal cross-section with a flared base, nearly identical to that of its counterpart to the north (HAER No. MI-98-A). The flat top of the dam is 12'-0" wide; from the apex, both the upstream and downstream sides descend at a slope of 2:1. On the upstream (west) side, the descent is interrupted after about 3' by an 8'-3" wide berm created when Consumers Power Company raised the height of the embankment in 1925. The concrete corewall forms the upstream side of the berm. Below it, the embankment's slope descends toward the riverbed at a 3:1 grade. The grade of the downstream (east) side changes from 2:1 to a more shallow 4:1 about 14' from the top of the dam. Grass covers the embankment above the water level.[1]

[1] This description is based on a site survey completed by the authors on 27 July 1995 and on an engineering drawing of the dam. See Commonwealth Power Corporation for Consumers Power Company, "Cooke Dam—Raise Head, Corewall, etc., 1925," Drawing M28-F1005, Corporate Archives, Consumers Power Company, Bridge Street, Jackson, Michigan.

HISTORY

William G. Fargo of Fargo Engineering Company, Jackson, Michigan, designed the Cooke dam for Consumers Power Company. Fargo, a civil and hydraulic engineer who specialized in building dams on soil foundations, had worked with J.B. Foote, Consumers' chief electrical engineer, on a number of facilities by the time construction began at Cooke (HAER No. MI-98).[2] For this site, Fargo designed an earthen embankment with a poured, reinforced concrete corewall imbedded just upstream (west) of the dam's midsection. The dam is often characterized as a semi-hydraulic fill embankment, a name that refers to its method of construction.[3]

Semi-hydraulic fill dams are built by first carting earthen building material, known as fill, to the dam site from a borrow pit. High-pressure jets of water aimed at the fill move it into place at the core of the dam. This process also segregated the material by weight. Heavier fill particles separate first from the stream of water while the smaller, lighter particles settle toward the center of the embankment. This arrangement—a core of small particles surrounded by larger, coarser ones—makes the center of the dam more impervious to water while allowing drainage through the coarser outside layers. The corewall also helps prevent saturation of the dam.[4]

Earthen dams did not constitute an unusual type at the time of Cooke's construction, but the hydraulic and semi-hydraulic fill methods were relatively new. The use of water to place dam materials, an adaptation of placer mining techniques, had been developed around the turn of the century. Fargo helped pioneer hydraulic fill construction in the Midwest.[5]

Work on the Cooke Hydroelectric Plant began in autumn 1909. Consumers Power Company took advantage of an existing sixteen-mile, narrow-gauge logging railroad to have machinery and building materials delivered to the site from Au Sable, the nearest town. A timber diversion crib built across the river channel restricted the Au Sable's flow to the north end of its natural channel, near the north riverbank. Crews used a drag-line excavator to clear the site in preparation for construction. They also felled trees in the area to build 90'-high railroad trestles

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[2] See Charles K. Hyde, "Croton Hydroelectric Plant, Dam," HAER No. MI-81-A, 1994 Historic American Building Survey/Historic American Engineering Record, Library of Congress, Washington, D.C. Fargo is listed in John William Leonard, *Who's Who in Engineering 1922-1923* (New York: John Leonard Corporation, 1922), 425-426.

[3] For an extensive contemporary account of the construction methods used at the Cooke site, see "The Design and Methods Employed in Constructing the Cooke Water Power Plant on the Au Sable River in Michigan," *Engineering and Contracting* 37 (5 June 1912): 639-644.

[4] Duncan Hay, *Hydroelectric Development in the United States: 1880-1940* (Washington, D.C.: Edison Electric Institute, 1991), 53-54.

[5] Hay, 53 and Hyde, 2.

across the river channel to aide in the transport of materials.

Early in 1911, crews poured concrete for the Spillway (HAER No. MI-98-B) in midriver, thus providing a new channel for the Au Sable's flow. With the remainder of the riverbed clear of water, workers poured the South Embankment's 12"-thick reinforced corewall, keying it into the clay riverbed. By September of that year, railroad cars began hauling fill onto the trestle so that it could be dumped and sluiced it into place. The dam rose about 50' above the riverbed, slowly burying the railroad trestles in the process.

The South Embankment continues to serve its original function of impounding water in the Au Sable River. The only significant change to Cooke's embankments and corewalls occurred in 1925, when Consumcrs Power Company added fill to the dam to increase its height by 3'-9". At the same time, the company also appended a 2'-0" cap to the corewalls to accommodate an equal increase in the headwater elevation.[6]

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[6] Commonwealth Power, Drawing M-28-F1005.

SOURCES OF INFORMATION

ENGINEERING DRAWING

Commonwealth Power Corporation for Consumers Power Company. "Cooke Dam—Raise Head, Corewall, etc., 1925." Drawing M28-F1005. Corporate Archives, Consumers Power Company, Bridge Street, Jackson, Michigan.

HISTORIC VIEWS

Cooke Hydroelectric Plant construction and overview photographs. Hydro Operations, Consumers Power Company, Cadillac, Michigan.

MANUSCRIPT SOURCE

Hyde, Charles K. "Croton Hydroelectric Plant-Dam." HAER No. MI-81-A, 1994. Historic American Building Survey/Historic American Engineering Record Collection, Library of Congress, Washington, DC.

PUBLISHED SOURCES

"140,000-Volt Power Transmission." *Engineering News* 67 (16 May 1912): 912-917.

"The Design and Methods Employed in Constructing the Cooke Water Power Plant on the Au Sable River in Michigan." *Engineering and Contracting* 37 (5 June 1912): 639-644.

Hay, Duncan. *Hydroelectric Development in the United States: 1880-1940.* Washington, D.C.: Edison Electric Institute, 1991.